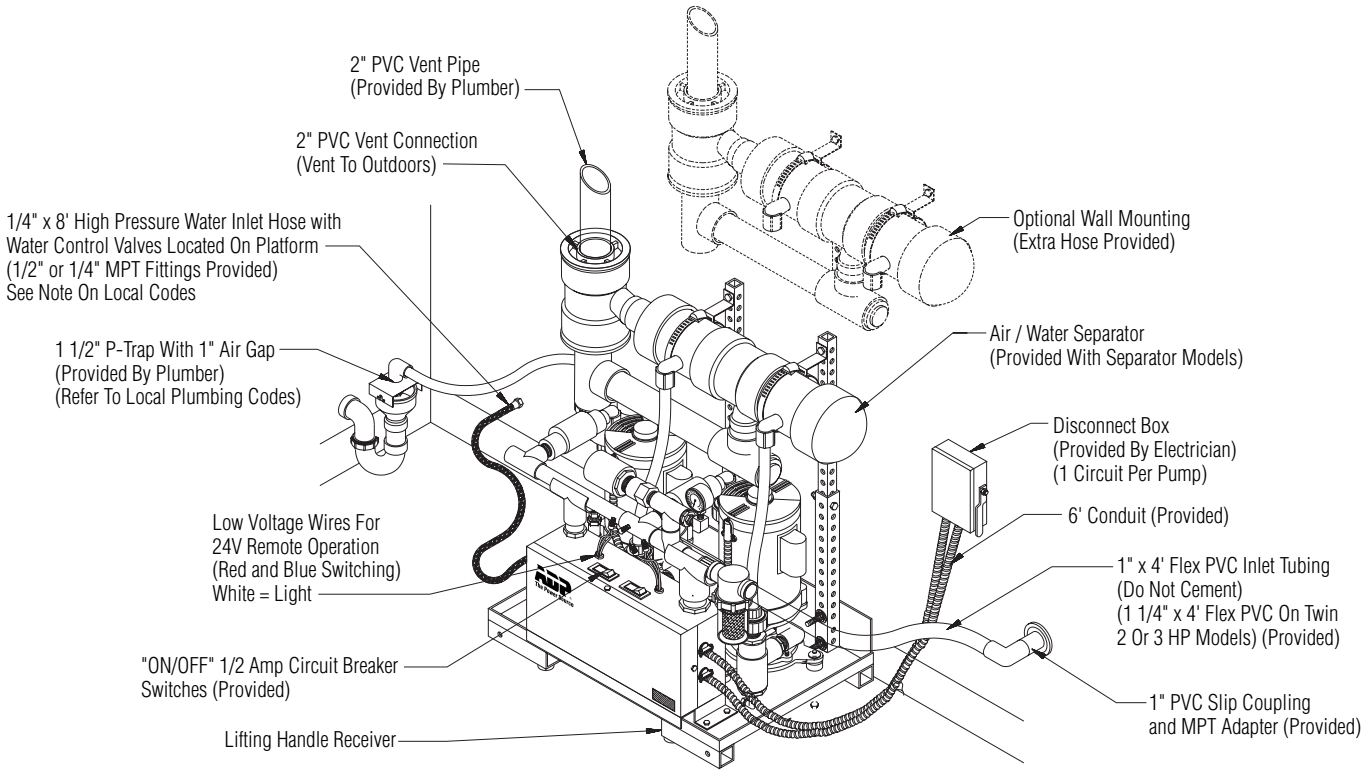
Apollo
by MIDMARK

Installation & Operation
Twin Vacuum System


2" PVC Vent Pipe
(Provided By Plumber)
2" PVC Vent Connection
(Vent To Outdoors)
1/4" x 8' High Pressure Water Inlet Hose with
Water Control Valves Located On Platform
(1/2" or 1/4" MPT Fittings Provided)
See Note On Local Codes
1 1/2" P-Trap With 1" Air Gap
(Provided By Plumber)
(Refer To Local Plumbing Codes)
Low Voltage Wires For
24V Remote Operation
(Red and Blue Switching)
White = Light
"ON/OFF" 1/2 Amp Circuit Breaker
Switches (Provided)
Lifting Handle Receiver
Optional Wall Mounting
(Extra Hose Provided)
Air / Water Separator
(Provided With Separator Models)
Disconnect Box
(Provided By Electrician)
(1 Circuit Per Pump)
6' Conduit (Provided)
1" x 4' Flex PVC Inlet Tubing
(Do Not Cement)
(1 1/4" x 4' Flex PVC On Twin
2 Or 3 HP Models) (Provided)
1" PVC Slip Coupling
and MPT Adapter (Provided)

NOTE: Some Local Codes Require A Reduced Pressure (RP) Backflow Preventor On The Incoming Water Line. (Not Provided)

Description:

Apollo Vacuum Systems have been tested and approved by various regulatory test agencies. The following list contains Apollo File Numbers that may be helpful if questions arise regarding installation inspections.

Underwriter's Laboratories (UL) (cUL) ..... File Number: MH13627
U.S. Food and Drug Administration (FDA) ..... File Number: 2937927
City of Los Angeles Mechanical Test Labs ..... File Number M880066

This dental vacuum system should only be installed by qualified personnel. Should any questions arise during the installation, call Apollo Technical Support between the hours of 7:00 a.m. to 4:00 p.m. (Pacific Standard Time).

Unpacking The System:

Place the Vacuum System in a clean, dry, well ventilated area, on a solid, level surface. Consider sound level and insulate as needed. Be sure that adequate ventilation is available as the Vacuum System is air-cooled. Ambient temperature in the equipment room should be within the temperature range of 40 degrees Fahrenheit (4^0 C) minimum to 100 degrees Fahrenheit (38^0 C) maximum.
Do Not Allow The Vacuum To Freeze.

1. Remove the cardboard from the shipping platform.
2. Inspect pump for freight damage and confirm that the Pump Installation Kit is in the box.
3. Remove the pump from the shipping platform.

Vacuum Pump Specifications:

Model	Max Users	Width	Depth	Height ***	Shipping Weight	Total HP	Volt	Amperage (Per Pump)	Hz	Wire GA*	Breaker Size**
AVG10TNFX / AVU10TNFX	6	66 cm	44 cm	76 cm	64 kg	2	220	8.1	50	14	2@20
AVG10TNX / AVU10TNX	6	26 in	18 in	30 in	140 lb	2	115/208-230	16.2/8.1	60	10/14	2@30/2@20
AVB10TN*	5	26 in	18 in	20 in	140 lb	2	115/208-230	16.2/8.1	60	10/14	2@30/2@20
AVB10TNFX	5	66 cm	44 cm	76 cm	66 kg	2	220	8.1	50	14	2@20
AVB10TNX	5	26 in	18 in	30 in	145 lb	2	115/208-230	16.2/8.1	60	10/14	2@30/2@20
AVG15TNFX / AVU15TNFX	7	66 cm	44 cm	76 cm	70 kg	3	220	11	50	14	2@20
AVG15TNX / AVU15TNX	7	26 in	18 in	30 in	115 lb	3	208-230	11	60	14	2@20
AVB15TN*	6	26 in	18 in	20 in	155 lb	3	208-230	11	60	14	2@20
AVB15TNFX	6	66 cm	44 cm	76 cm	73 kg	3	220	11	50	14	2@20
AVB15TNX	6	26 in	18 in	30 in	160 lb	3	208-230	11	60	14	2@20
AVB20TNX	8	26 in	18 in	32 in	165 lb	4	208-230	12.4	60	14	2@20
AVG20TNFX / AVU20TNFX	10	66 cm	44 cm	81 cm	75 kg	4	220	12.4	50	14	2@20
AVG20TNX / AVU20TNX	10	26 in	18 in	32 in	165 lb	4	208-230	12.4	60	14	2@20
AVG30TNFX / AVU30TNFX	12	66 cm	44 cm	81 cm	80 kg	6	220	14	50	14	2@30
AVG30TNX / AUG30TNX	12	26 in	18 in	32 in	175 lb	6	208-230	14	60	14	2@30

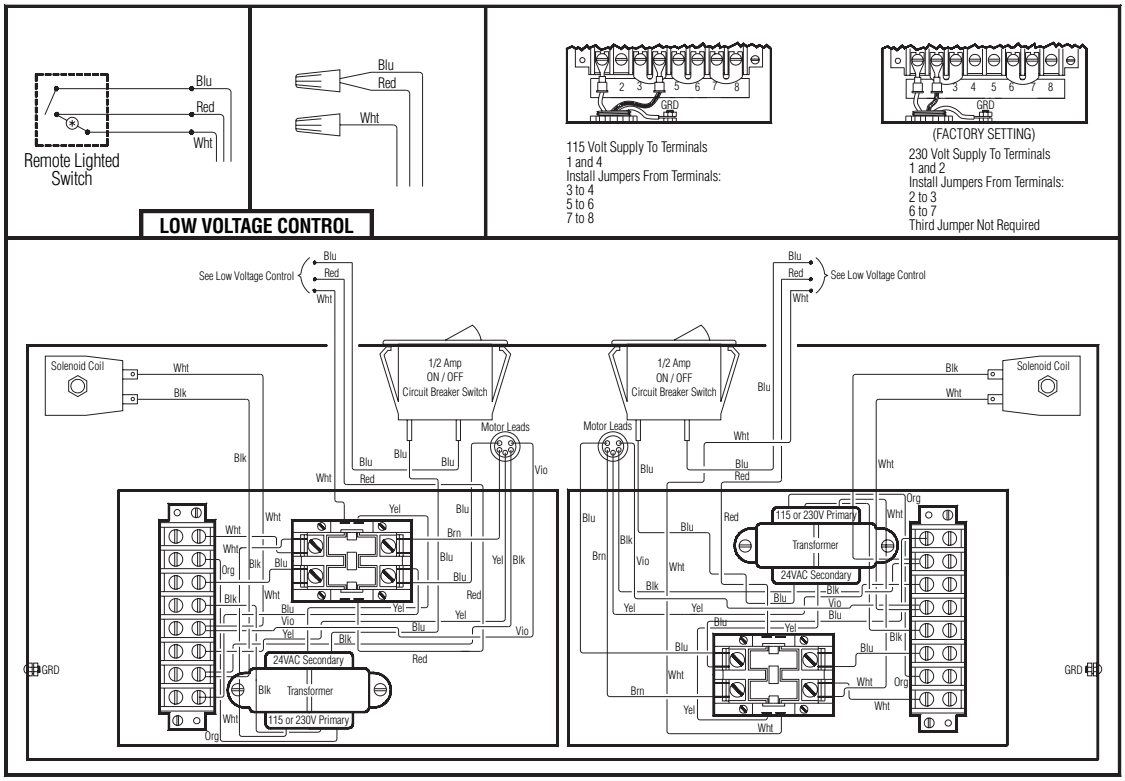
For Recycler option, add "R" to last prefix only. Example: AVB10TNR.

*Non separator models, VB10TN and VB15TN, are not recommended for single pump operation.

** Each pump requires a separate electrical circuit.

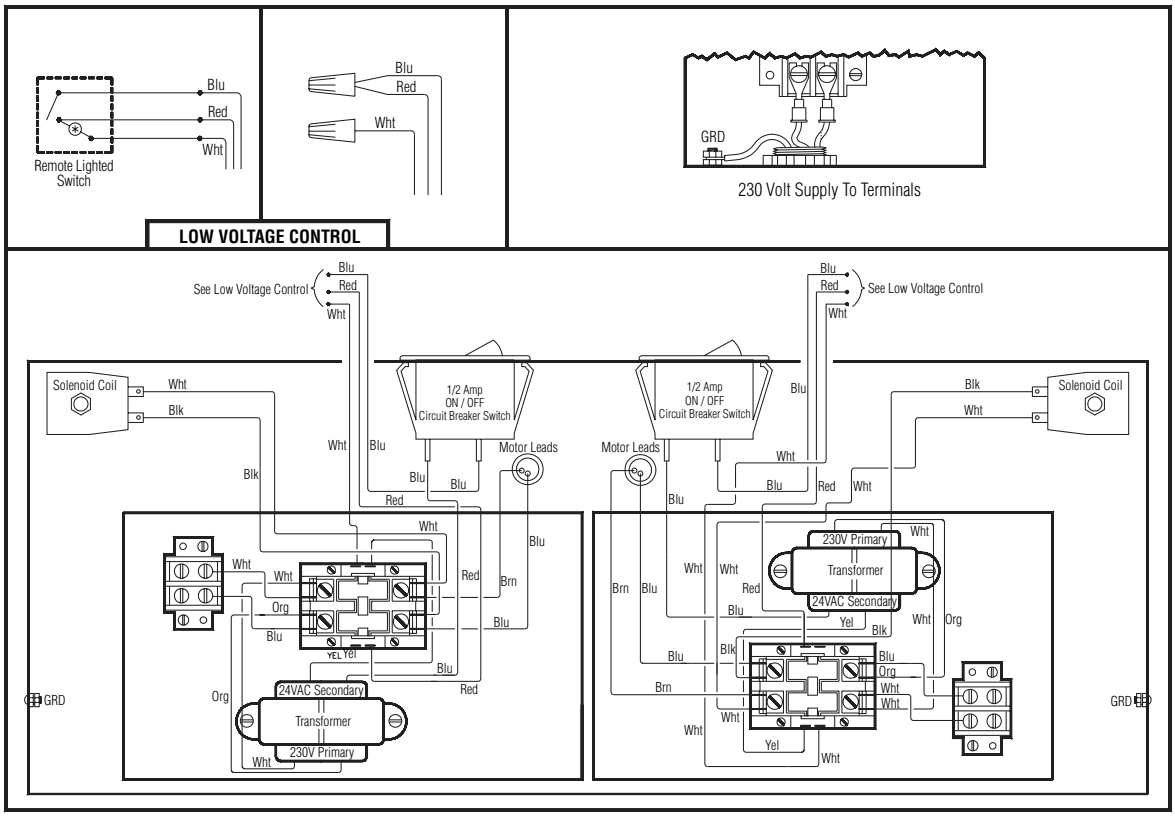
*** Height with Exhaust Separator

Dual Voltage Models



IMPORTANT: All Vacuum Systems are to be installed according to local plumbing and electrical codes. Never operate the equipment without complete and proper grounding.

Single Voltage Models



A. Electrical Hook-Up Requirements:

Low Voltage Line (24V)

18-3 Thermostat wire from each remote control switch to each vacuum; if low voltage remote control switching is desired. **Red** and **Blue** wires are for switching, the **White** wire is for a lighted switch, paired with **Red**.

Line Voltage (60 Hz)

Two, single-phase, 115 or 208-230 volt, 60 Hz, supply circuit with approved ground connection required. The 1HP units are dual voltage 115/208-230 volt. The 1 1/2, 2 and 3HP units are 230 volts only. **All units are factory wired for 208-230 volt operation:** 208-230 volt operation is recommended for maximum efficiency.

Line Voltage (50 Hz)

Two, single phase, 220 volt, 50 Hz., supply circuit with approved ground connection is required. **All units are factory wired for 220 volt operation:** 220 volt operation is recommended for maximum efficiency.

B. Plumbing Hook-Up Requirements: **(See Illustration on Page 1)**

Water Line

1/2 inch (13mm) cold water supply line with shut off valve terminating in 1/2 inch (13mm) FPT. **The line must be flushed out with 5 gallons of water prior to connection to vacuum.**

IMPORTANT: Water is essential for the operation and longevity of the pump. The supply must not be restricted or interrupted during operation. Water with high mineral content may cause mineral build-up and create water starvation, leading to seal failure. A water softener and filter are recommended for this situation. (*To prevent gradual buildup, use StayClean™ Mineral Deposit Remover)

Waste Line

Water drains to sewer terminating in:
Option A - Floor sink.
Option B - P-trap adapted to 3/4 inch (19mm) PVC slip connection, A 1 inch (25mm) air gap may be required by local code.

Air Vent

2 inch PVC air vent to outdoors. **Do not cap vent, serious back pressure may result in pump failure.**

Vacuum Line (Do Not Cement)

1 inch (25mm) PVC female slip connection. 2 and 3 HP models require a 1 1/4 inch (38mm) PVC slip connection. Guidelines for the proper design of a vacuum piping system are given in the following sections.

IMPORTANT: Continuosly running sinks or cuspidors must NEVER be connected to the vacuum piping system as pump failure may result.

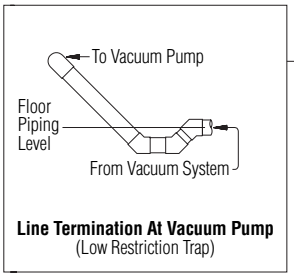
C. Vacuum Piping System Guidelines:

The design of the vacuum piping can have a large effect on the efficiency and reliability of the dental vacuum system. Experience has shown that the most effective vacuum piping designs are based on the air velocity that will occur in the lines. The velocity must be high enough to entrain all liquids and sediment in the air flow so that they do not accumulate in the lines. At the same time; the velocity must not be so high as to cause unacceptable vacuum losses. The Vacuum Line Sizing chart is based on maintaining an optimum air flow velocity according to the criteria described above. Use of single size pipe will result in poor performance.

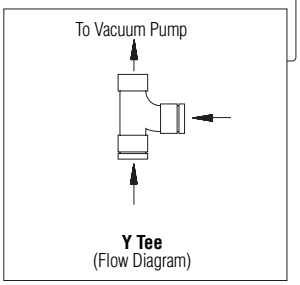
D. Vacuum Line Sizing Chart:

Number Of Operatories Supplied Through Line	Pipe Diameter In Inches (MM)
1	3/4" (19)
2	1" (25)
3	1" (25)
4	1 1/4" (32)
5	1 1/4" (32)
6	1 1/2" (38)
7	1 1/2" (38)
8	1 1/2" (38)
9	2" (50)
10	2" (50)
11	2" (50)
12	2" (50)

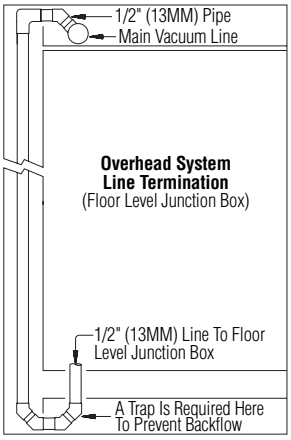
NOTE:
Use the number of operatories being supplied, not the number of outlets within the operatories to determine line size at any given point. Branch lines to individual operatories off of the main suction line should be 3/4 inch diameter.



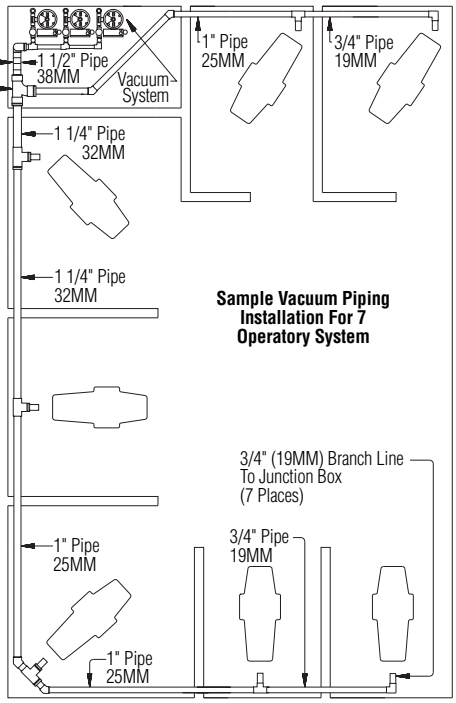
Line Termination At Vacuum Pump
(Low Restriction Trap)



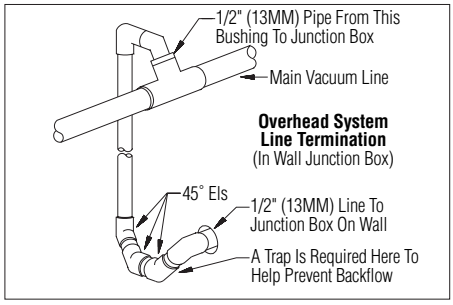
Y Tee
(Flow Diagram)



Overhead System Line Termination
(Floor Level Junction Box)



Sample Vacuum Piping Installation For 7 Operatory System


1/2" (13MM) Pipe From This Bushing To Junction Box
Main Vacuum Line
45° Els
1/2" (13MM) Line To Junction Box On Wall
A Trap Is Required Here To Help Prevent Backflow
Overhead System Line Termination
(In Wall Junction Box)

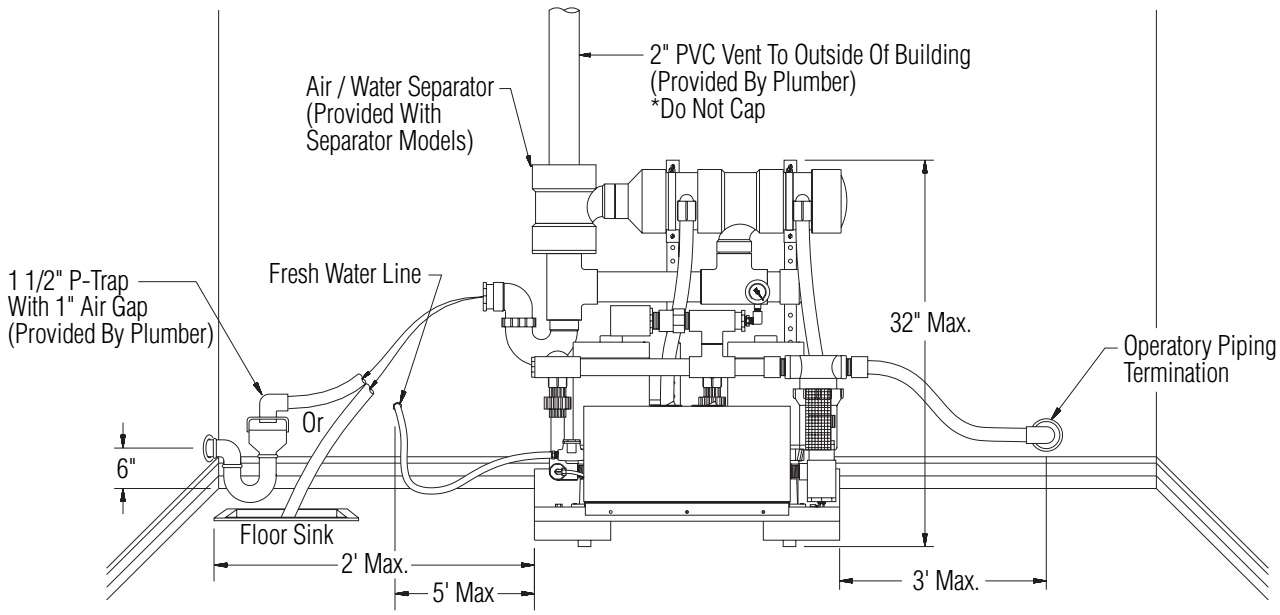
The vacuum lines should be supported to prevent sag and should be sloped 1/4 inch (6 mm) for every 10 feet (3m) towards the vacuum pump.

It is of primary importance to minimize 90 degree turns in the system. These will not only cause vacuum losses, but will also provide areas where sediment can accumulate. A combination of two 45 degree elbows are preferable to a 90 degree elbow. Restrictions in the line will also cause vacuum loses. Y-tee fittings should be used whenever possible.

Overhead systems require the use of the next largest size vacuum pump. Overhead systems also require a 1/2 inch (13mm) line rather than 3/4 inch (19mm) from the operatories to the main line, and special provisions to ensure that liquids do not travel back into the operatories.

A sample vacuum piping diagram is shown. Consult Apollo Technical Support for further information regarding vacuum line sizing.

Typical Installation



E. Installing Vacuum System With Exhaust Separator:

1. Place the vacuum unit on a solid level floor within 2 feet (0.6m) of waste line P-trap or floor sink.
2. The exhaust separator comes premounted to base. Should it need to be remotely wall mounted, simply glue in provided hose using 3/4" couplings (provided). Next, remove holding pins and wall mount the separator utilizing the holes in the extension tubing as mounting holes. Remember, the separator should be located at least 2 inches (5cm) above a waste connection and within 3 feet (1m) of the vacuum exhaust.
3. Connect operatory vacuum line to intake strainer using the provided suction hose. **Do not cement the suction line.**
4. Attach provided 3/4 inch (19mm) drain hose to P-trap or floor sink from bottom drain fitting of exhaust separator and **CEMENT** with PVC glue.
5. Install 2 inch (5cm) PVC vent line off the top of the exhaust separator and vent to the outdoors. *Failure to do so will result in moist air in the room.
6. Connect the provided water hose to a 1/4 or 1/2 inch (13mm) water supply line with the provided hose fittings.

   NOTE: It is recommended to purge at least 5 gallons of water through water line before attaching to vacuum. (Sediment in water lines of new buildings is common.)
7. Connect high voltage electrical supply lines as indicated in the electrical diagram.
8. For low voltage remote control, connect low voltage wires of corresponding color from the Apollo Master Control Panel vacuum switches.

F. Initial Start-Up:

1. Check that the water supply valves are **"OPEN"**.
2. Start the pumps.
3. Check exhaust tubing to ensure that water is flowing through the pumps.

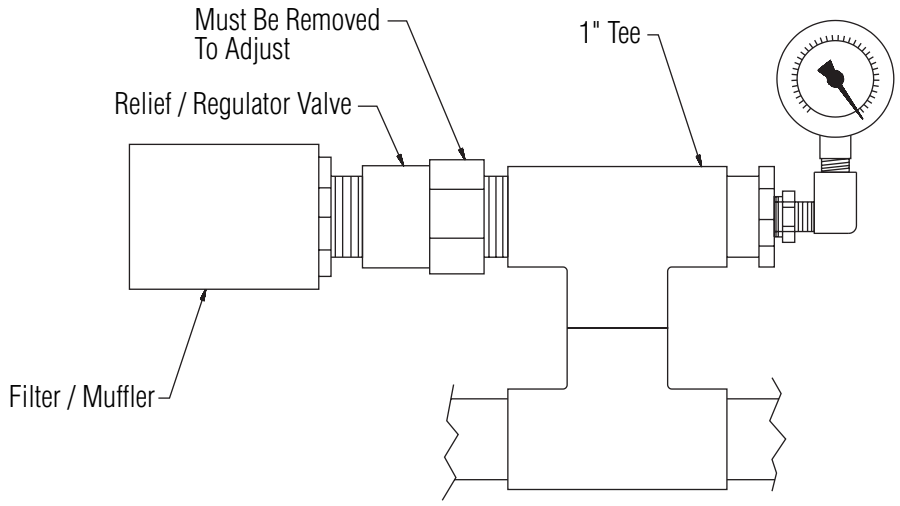
IMPORTANT: Do not run pump without full pressure water supply, or serious pump seal damage could result.

4. Check waste drain line to ensure that water is draining properly and that there are no water leaks.
5. Check vacuum gauges to ensure that each pump is functioning properly. Vacuum relief is factory preset for 10 inches Hg (34 KPa) Vacuum.
6. Store this installation manual for future reference.

G. Vacuum Level Adjustment:

The Vacuum level is adjustable in the range of 8 to 13 inches Hg (27 to 44 KPa).

1. Remove the filter and valve from the PVC elbow.
2. Using a 1/4" nutdriver and a phillips screwdriver adjust the center mounted screw within the valve. Each full clockwise turn increases the vacuum level by approximately 2" Hg.



Maintenance:

Maintenance Procedure	Daily	Weekly	Monthly	Semi-Annually	Annually
Cleanse Vacuum Piping System	●				
Clean Vacuum Pump Intake Filter		●			
Clean In-Operatory Strainers		●			
Check Vacuum Level			●		
Clean And Dust Off Vacuum Pumps				●	
Replace Recycler Return Lines					●
Clean Or Replace Relief/Regulator Filter					●
Clean Water Inlet Strainer					●

Trouble-Shooting Guide

PROBLEM: Motor will not start when turned "ON".

Cause: No power to pump motor.
Remedy:
1. Check for proper voltage at pump terminal block input terminals(±10% of rated voltage). If proper voltage is not present, check circuit breaker and supply circuit.
2. If low voltage switching is being used, bypass low voltage circuit by connecting the red and blue wires from the top of the electrical box.
3. Reset circuit breaker switches located on top of electrical box. To reset, momentarily turn "OFF" then back "ON".
4. Check the voltage between the blue and white low voltage wires. If it is not between 20 and 28 VAC the ON/OFF switch or the transformer may be defective, or there is a faulty connection within the box.
5. If the voltage of step 3 is within limits and the relay contacts were not closing, replace relay.

PROBLEM: Pump runs but creates insufficient "suction".

Cause: Vacuum intake filter clogged.
Remedy:
1. Clean filter, or replace with ADP Dispos-A-Bowl™.

Cause: Faulty vacuum system:
Remedy:
1. Remove the vacuum inlet line from the pump. If there is good suction at the pump, but little to none in the system, the system is clogged or contains leaks. Locate the problem and repair.

Cause: Low relief/regulator valve setting
Remedy:
1. Adjust as illustrated in vacuum adjustment section. * Note: When adjusting be sure to block off inlet for maximum vacuum adjustment.

Cause: Inadequate water supply.
Remedy:
1. Make sure water supply valve to pump is fully "OPEN".
2. Unscrew hex cap from water inlet strainer and check for clogged filter screen. Clean as required.
3. Check for proper voltage at water solenoid coil (115 VAC ±10%). If proper voltage exists replace water solenoid. (208 VAC ±10% on all Twin 2 or 3 HP models.)
4. Check water regulator to see if it is plugged.

Cause: Inadequately sized pump.
Remedy:
1. Check usage chart for maximum number of simultaneous users. Upgrade if necessary.

PROBLEM: Pump runs but creates excessive vacuum.

Cause: Clogged vacuum relief filter.
Remedy:
1. Unscrew filter/muffler from valve. Clean or replace filter media and reassemble.

Cause: High relief/regulator valve setting.
Remedy:
1. Adjust as indicated in vacuum level adjustment section. *Not recommended higher than 13" HG.

PROBLEM: Pump will not run continuously.

Cause: Overheating. Thermal protection shutdown.
Remedy:
1. Check for adequate ventilation. The motor is air cooled and a ventilation fan may be required.

Cause: Circuit breaker tripping.
Remedy:
1. Check for incorrectly sized or defective circuit breaker.

Cause: Faulty relay.
Remedy:
1. Check for proper gauge size. Replace relay if contacts fail to remain closed.

Description	Part Number
Cover - Electrical Box	ECB-80581
Bushing - 1" MPT x 3/4" FPT	PCV-50992
Dispos-A-Bowl 3/4"	AVA60001
Dispos-A-Bowl 1"	AVA60011
Dispos-A-Bowl 1 1/4"	AVA60021
1/4" MPT x 1/4" Poly-flow	PCB-50450
Elbow - 3/4" MPT x 3/4" SLP	PVC-50207
Elbow - Street 1" NPT PVC	PVC-51021
Filter - Relief Valve 1" FPT	SVA-95819
Gauge - Vacuum	PGA-70415
Jumper - 2 Terminal 115/230 VAC	ECC-10225
Motor - 1 HP (60 Hz.)	HFM-30905
Motor - 1 HP (50 Hz.)	HFM-30915
Motor - 1 1/2" HP (60 Hz.)	HFM-30910
Motor - 1 1/2" HP (50 Hz.)	HFM-30920
Motor - 2 HP (50/60 Hz.)	HFM-30911
Motor - 3 HP (50/60 Hz.)	HFM-30912
Nipple - 3/4" MPT Close (Brass)	PCB-50475
Nipple - 3/4" x 2" (Brass)	PCB-50470
Nipple - 3/4" Close (PVC)	PVC-50520
Nipple - 1" Close (PVC)	PVC-51022
O-Ring - Pump Housing, 1 & 1.5 HP	MRP-70955
O-Ring - Pump Housing, 2 & 3 HP	MRP-70957

Description	Part Number
Relay - 24 VAC	ETR-10460
Feet - Studded Rubber	MRP-70963
Feet - Rubber Washers	MRP-70964
Seals - Shaft Seal Assembly, 1 & 1.5 HP	SVA-95845
Seals - Shaft Seal Assembly, 2 & 3 HP	SVA-95847
PVC Tee 1"x 1"x 3/4" Slip	PVC-50721
Strainer - 1" FPT Vacuum Inlet	PVC-50706
Strainer - 1 1/4" FPT Vacuum Inlet	PVC-50708
Strainer - 1/4" FPT Water	PCB-50960
StayClean 64 oz. Bottle	ASC00002
StayClean (64) 1 oz. Tubes	ASC00001
StayClean Non-Foaming Cleaner (4) 64 oz.	ASC00005
Switch - 1/2 Amp Circuit Breaker	ECS-10422
Transformer - 115/220 Volt 24 VAC	ETR-10500
Tubing - 3/4" PVC (19mm)	PCT-80460
Tubing - 1 1/4" PVC (32mm)	PCT-80461
Tubing - 1/4" Poly-flow 135 psi (6mm)	PCT-80610
Union - 3/4" Slip (PVC)	PVC-50200
Valve - 1/4" FPT Anti-Siphon	PVV-50595
Valve - Check Valve Assembly (Intake)	SVA-95700
Valve - Relief / Regulator 1" MPT	PVV-85981
Valve - Solenoid 1/4" FPT 115 VAC	PVV-10470
Valve - Solenoid 1/4" FPT 230 VAC	PVV-10472

*To order parts, contact your authorized ADP Dealer.

Warranty Information:

- **Classic Bronze™ = 2 Year**
- **Gold Series™ = 2 Year**
- **UltraVac® = 3 Year**

All Apollo products are thoroughly inspected and tested in accordance with rigid specifications and standards. Our products are guaranteed against defective material and workmanship from the date of shipment; provided, that the installation, operation, and maintenance is done in accordance with Apollo's procedures as outlined in the provided manuals. **Warranty cards must be returned to Apollo within ten days of the installation to effect warranty**. No other warranties, or guarantees, expressed or implied are made.

Apollo's obligation under the warranty is to provide parts for the repair or, at Apollo's option, provide the replacement product, **excluding labor and shipping charges**. All special, incidental and/or consequential damages are excluded. Apollo will not issue credit for product without first attempting to correct the problem in the field. Written notice of breach of warranty must be provided to Apollo within the warranty period. The warranty does not cover damage resulting from the use of cleaning, disinfecting or sterilizing chemicals and processes. On vacuum products, the **warranty does not cover failures due to hard water deposits**. Failure to following installation and operation procedures will void the warranty.